

Circuit Arrangement for the Dynamic Control of  
Ceramic Solid-State Actuators

Background of the Invention

33 1. Field of the Invention

The invention relates to a circuit arrangement for the dynamic control of ceramic solid-state actuators, such as for example, piezotranslators with energy recovery by means of magnetic intermediate stores as well as a control loop for operating a piezotranslator.

2. Description of the Related Art

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Summary of the Invention

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The object of the invention is solved in that for achieving a predetermined linear voltage characteristic at the piezotranslator, the secondary circuit is designed as a half-bridge consisting of the clocked switches at whose output the inductive intermediate store is arranged in series with the piezotranslator, with the clocked switches being externally controlled and operated at a high cycle or switching frequency in such a manner that the intermediate store is alternately connected with an upper or lower supply voltage at the most, with the series connection of piezotranslator and inductive intermediate store carrying a superimposed bridge direct current as well as, as far as the closed loop control is concerned, by a third controller for a positioning control, at whose first input the reference variable of the physical position of the piezotranslator and at whose second input a mechanical actual value which is detected via a sensor of the piezotranslator are applied, with the output of the third controller being connected with one of the inputs of the second controller, wherein preferably the second controller feeds back the integral of the piezotranslator current in lieu of a voltage which is proportional to the output voltage of the final stage. The remaining dependent claims represent at least suitable embodiments or developments of the invention.

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Brief Description of the Drawings

The invention will be described in more detail by means of embodiments as well as with reference to the figures in the following.

In the figures:

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- Fig. 1 shows a circuit diagram of the circuit arrangement for the dynamic control of piezotranslators with energy recovery;
  - Fig. 2 shows a configuration of the MOSFET switch with an external blocking diode and a commutating diode oppositely poled relative to same;
  - Fig. 3 shows a block diagram of the control system with an inner and an outer control loop comprising the optional possibility to adapt the outer control loop to the integration value of the current;
  - Fig. 4 is an illustration of the control system with additional positioning control;
  - Fig. 5 shows a block diagram for reducing the low-frequency voltage noise; and
  - Fig. 6 shows a block diagram of a known fine control.

Description of Preferred Embodiments

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